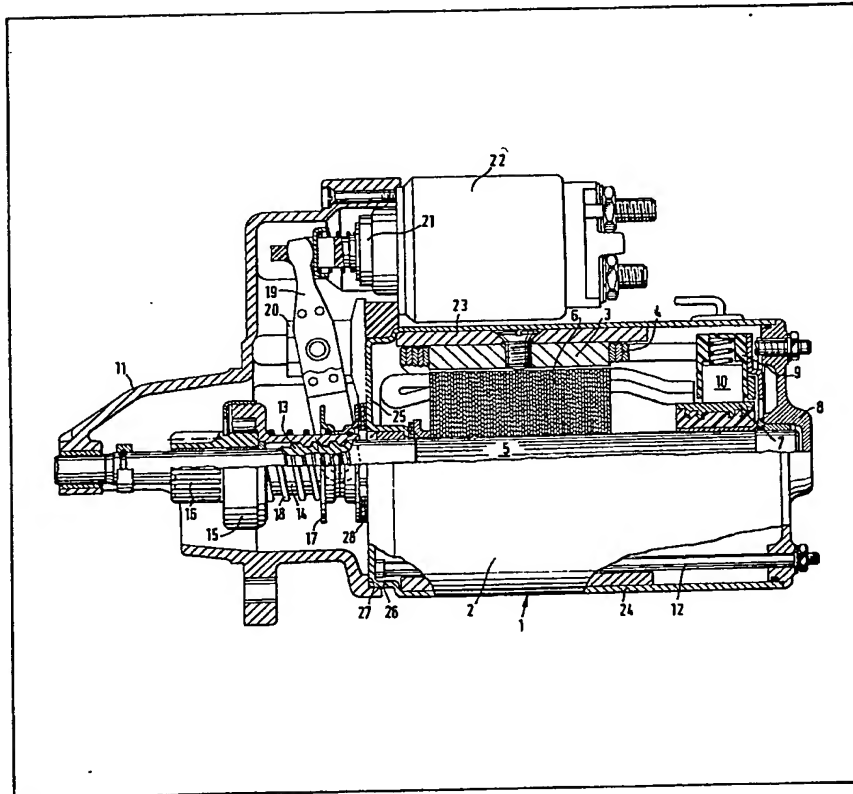


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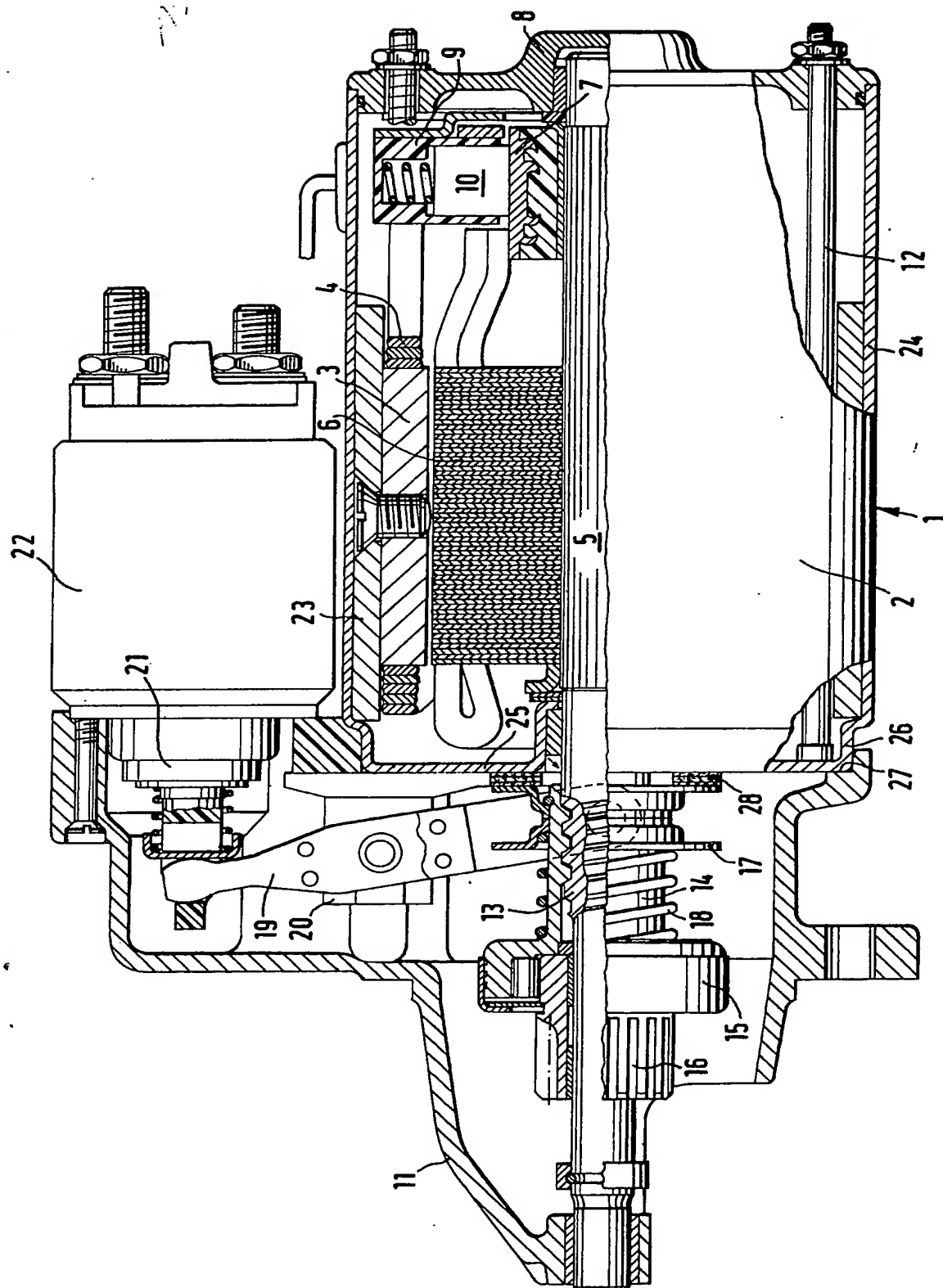
## (54) Starter for internal combustion engines

(57) The starter has a starter motor (1), an engaging relay (22) and a meshing drive (14 to 19) which is accommodated in a drive bearing flange (11) to which the pole housing (2) of the starter motor is secured. The pole housing (2) is produced by cold deformation and comprises a rolled internal cylinder (23) and a casing (24) which is integrally formed with an intermediate bearing flange (25); the cylinder (23) being fitted within the casing. The casing (24) is in the form of a deep-drawn member of hot-dipped galvanized sheet metal (is thus adequately corrosion resistant) and surrounds the starter motor (1) so as to protect the motor against dirt and moisture.



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## SPECIFICATION

## Starter for internal combustion engines

- 5 The invention relates to a starter for internal combustion engines, of the kind having a starter motor whose pole housing is produced by cold deformation and is secured to a drive bearing which accommodates a meshing drive, and an engaging relay.
- 10 relay.
- A starter is already known whose pole housing is deep-drawn from sheet steel and whose end face presented to the drive bearing is provided with a flange. The flange of the pole housing abuts against
- 15 a flange of the drive bearing. The two parts are held against one another by bolts which secure the starter to the internal combustion engine. The interior of the starter motor is fully open relative to the drive bearing, so that dirt and moisture can readily enter
- 20 the starter motor and lead to premature failure thereof. Furthermore, the exterior of the pole housing made from sheet steel has to be provided with protection against corrosion.

- There is provided by the present invention a
- 25 starter motor for internal combustion engines, having a starter motor whose pole housing is produced by cold deformation and is secured to a drive bearing which accommodates a meshing drive, and an engaging relay, wherein the pole housing comprises a rolled internal cylinder and a casing which is
- 30 integrally formed with an intermediate bearing of the motor drive shaft and into which the internal cylinder is fitted.

- In contrast to the known starter, the starter in
- 35 accordance with the invention has the advantage that the casing which surrounds the starter motor, and which is integrally formed with an intermediate bearing for the drive shaft, protects the starter motor against the intrusion of moisture and dirt. A further
- 40 advantage is that, compared with a separate intermediate bearing, the integral intermediate bearing serves as a support for the drive shaft to reduce errors of alignment.

- It is particularly advantageous that the casing
- 45 disposed in a recess in the drive bearing is provided with a reduced diameter portion for this purpose. Sealing means are no longer required at this location. Moreover, the casing in the form of a deep-drawn part made from hot-dipped galvanized sheet
- 50 metal is sufficiently corrosion-resistant and does not require any further protective measures.

- An embodiment of the invention is illustrated in the sole Figure of the accompanying drawing which is a fragmentary longitudinal section through
- 55 the starter of the embodiment.

- A starter has a starter motor 1 provided with a pole housing 2 in which poles 3 are secured. A field winding 4 is accommodated on the poles 3. The starter motor 1 has a drive shaft 5 to which are
- 60 secured an armature 6 and a commutator 7. That end of the pole housing 2 which faces the commutator is closed by a bearing cover 8 in which one end of the drive shaft 5 is rotatably mounted and to which a brush-holder 9 is secured in a known manner.
- 65 Brushes 10 which slide on the commutator 7 are

resiliently accommodated in the brush-holder 9.

- A drive bearing flange 11 is disposed on the other end face of the pole housing 2. The drive bearing flange 11 and the bearing cover 8 are secured to the
- 70 end faces of the pole housing 2 by tie rods 12.

- A driver 14 is movably arranged on a coarse thread 13 formed on that portion of the drive shaft 5 which extends within the drive bearing flange 11. The driver 14 is operatively connected by means of a
- 75 roller-type overrunning clutch 15 to a starting pinion 16 which is movably mounted on the drive shaft 5. The end of the drive shaft 5 is rotatably received in an extension of the drive bearing flange 11. An engaging sleeve 17 is displaceably disposed on the
- 80 driver 14. One end of a meshing spring 18 abuts against the engaging sleeve, and the other end of the meshing spring abuts against a driver flange. An engaging lever 19 is articulated to the engaging sleeve 17 and is pivotally arranged on a support
- 85 member 20. The support member 20 is in turn mounted in the drive bearing flange 11. The upper end of the engaging lever 19 is coupled to an armature 21 of an engaging relay 22 likewise secured in the drive bearing flange 11.

- The pole housing 2 comprises a rolled internal cylinder 23 in which the poles 3 are secured in a known manner (by screws, for example), and a deep-drawn casing 24. The casing 24 is made from hot-dipped galvanized sheet metal which is adequately corrosion-resistant. The casing is of cup-shaped construction. The bottom 25 of the casing serves as an intermediate bearing in which a journal for the drive shaft 5 is fitted.

- The casing 24 integrally formed with the intermediate bearing surrounds the starter motor 1, so that dirt and moisture can no longer enter the interior of the motor. Sealing means between the pole housing 2, 24 and the intermediate bearing 24 are also no longer required. The end portion 26 of the casing 24
- 105 is of reduced diameter. In the interior of the casing, the end portion 26 serves as an axial end stop for the internal cylinder 23 carrying the poles 3 with the field winding 4. Furthermore, the end portion 26 serves as a guide portion of the starter motor 1 relative to the
- 110 drive bearing flange 11 and is fitted in an annular recess 27 of the drive bearing flange 11 where it is secured to the drive bearing flange 11 by the tie rods 12.

- A brake disc 28 of a brake is also disposed on the
- 115 drive shaft 5 and abuts against the end face of the intermediate bearing 25 and is pressed against the engaging sleeve 17 when the engaging relay 22 is deenergized.

## 120 CLAIMS

1. A starter motor for internal combustion engines, having a starter motor whose pole housing is produced by cold deformation and is secured to a
- 125 drive bearing which accommodates a meshing drive, and an engaging relay, wherein the pole housing comprises a rolled internal cylinder and a casing which is integrally formed with an intermediate bearing of the motor drive shaft and into which the internal cylinder is fitted.
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2 GB 2 061 021 A

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2. A starter as claimed in claim 1, wherein the casing is fitted in a recess of the drive bearing.
3. A starter as claimed in claim 1 or 2, wherein the casing has a reduced diameter portion at the transition to the intermediate bearing.
4. A starter as claimed in any of the claims 1 to 3, wherein the casing is a member which is deep-drawn from hot-dipped galvanized sheet metal.
5. A starter motor substantially as hereinbefore described with reference to the accompanying drawing.

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